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OIL-BEARING DEVONIAN OF THE VOLGA REGION

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The Devonian deposits in the eastern half of the Russian platform have become of special interest following the discovery in them of industrial oil at the Samarskaya Luka in Tuymazy, and in the Prikam'ye.

As yet, industrial oil in the Devonian of the Middle-Volga region has been found only in the Yablonov ravine, where it is coordinated with porous sandstone of the Yablonov horizon which lies at the base of the Franskian stage of the Upper Devonian. A small quantity of oil is found in the Syzran Rayon Givetian deposits, and signs of oil are observed in various Devonian horizons of the Samarskaya Luka. Signs are not so evident in the Teplovo well in Saratov Oblast', although liquid petroleum was indicated here too in sandstones aligned with the Yablonov. The bitumen content in the upper horizons of the Devonian of Teplovka, with some exceptions, amounts to only thousandths of a percent by luminescence analysis.

The Devonian horizons seen in the Middle Volga region are coordinated principally with the lower Franskian and Givetian deposits. They are formed basically by terrigenous sediment and differ more or less distinctly from the upper Franskian and Famensk carbonate rock, which offer very little prospect of oil potential.

The Yablonov horizon in the Volga region, a series of littoral, mainly sandy sediments, is the productive oil-bearing horizon of the Devonian in the Yablonov ravine. It is the upper oil stratum of Tuymazy. In the Yablonov ravine, the horizon includes thick sandstone strata and is 28 to 38 m thick. Sandstones are pure quartz, more or less porous, easily crumbled in the hand, small-grained, and impregnated with liquid petroleum. The sandstones form three exploitable oil strata with a total thickness of 26 to 33 m. They are divided by strata of cemented sandstone and clayey rocks with streaks of light gray limestone, micrograined and pseudo-oolitic in structure. The thickness of the strata not penetrated by oil is 1.5 to 2.5 m.

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The lithological composition of the oil strata is quite uniform -- fine quartz grains. Traces of minerals of heavy fraction are in evidence. Calcite of poikilitic structure serves as cement and occurs in small accumulations between which the grains are cemented with oil. The productivity of the Yablonov horizon is very high. Porosity of the sandstone is calculated at 20-21%

A comparative study of Devonian and Carboniferous oils along the Volga, beyond the Volga, and in the Ukhta region was conducted by the All-Union Petroleum Scientific Research Geological Prospecting Institute (VNIGRI). It was concluded that the Samarskaya Luka and Tuymazy oils are close to methane. This is indicated by their low specific gravity, a comparatively similar fractional composition, high paraffin content, low viscosity, low specific gravity of the fractions, and low octane numbers of the gasoline.

The Yablonov horizon in Teplovka is 94 m thick. On the basis of core samples, it appears to be an almost unbroken stratum of porous sandstone. Oil was found only at the base of this layer in a sandstone streak covered by a thick bed of clay.

The industrial perspective of the lower horizons of the Devonian around the Volga is strengthened by the presence of good collectors, washout zones, the stability of the rock phase composition, and favorable conditions for the stratification of oil deposits.

In the area of Novokhopersk there are considerable sand accumulations reaching a thickness of 13.5 m in the Voronezh layers. The thickness of the sand accumulations should increase south of Novokhopersk. In connection with this, it is possible to picture a perspective area southwest of Saratov in the Medveditsa and Khoper river basins, possibly strethcing as far as the region of the Don-Medveditsa dislocations. And it is approximately this area which offers prospects also of oil and gas in the Carboniferous.

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